

Fig. 1

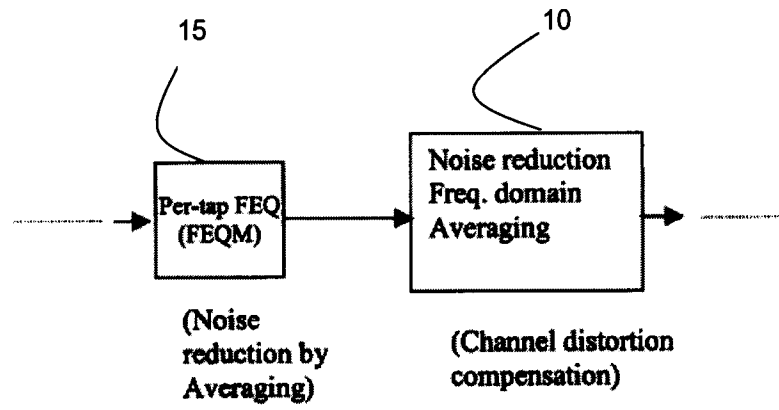


Fig. 2

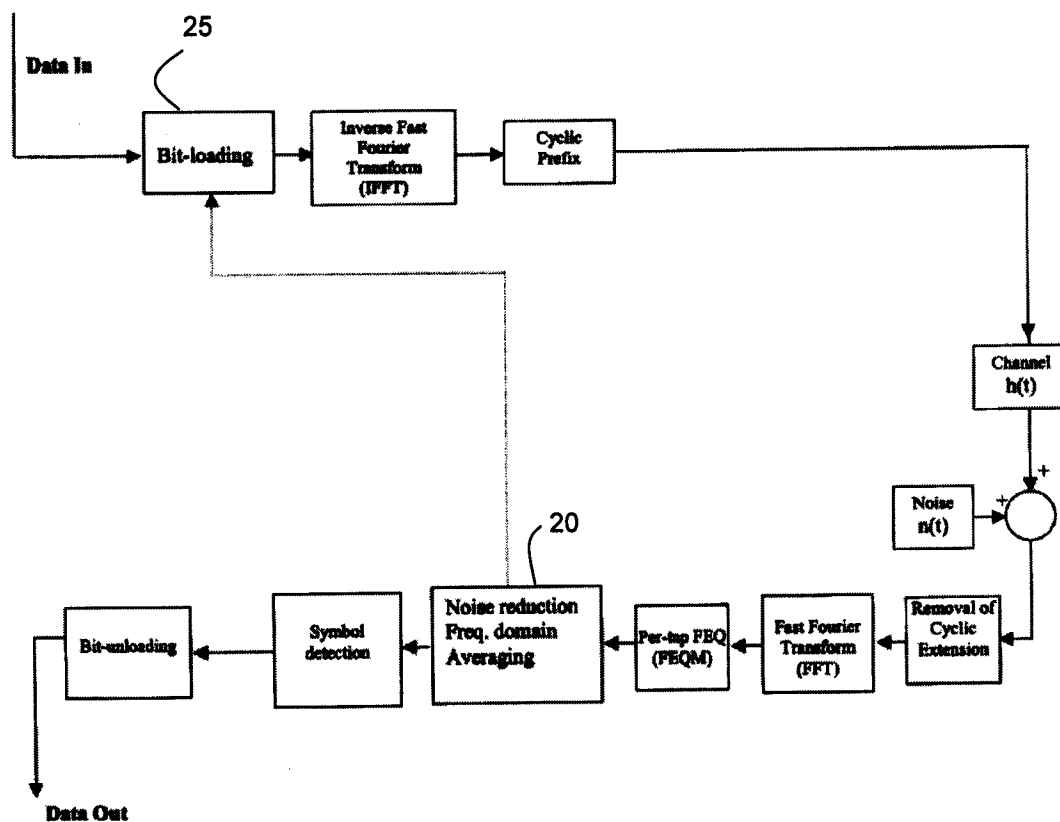


Fig. 3

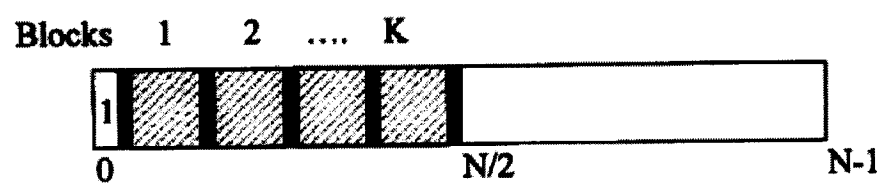


Fig. 4

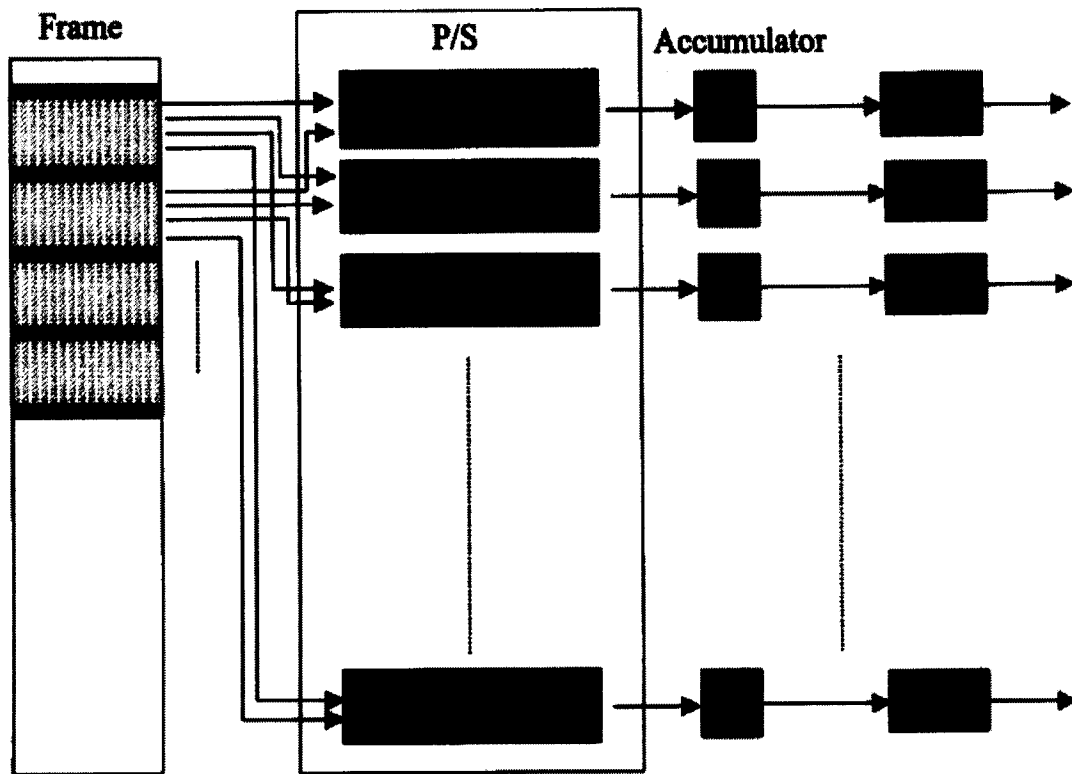


Fig. 5

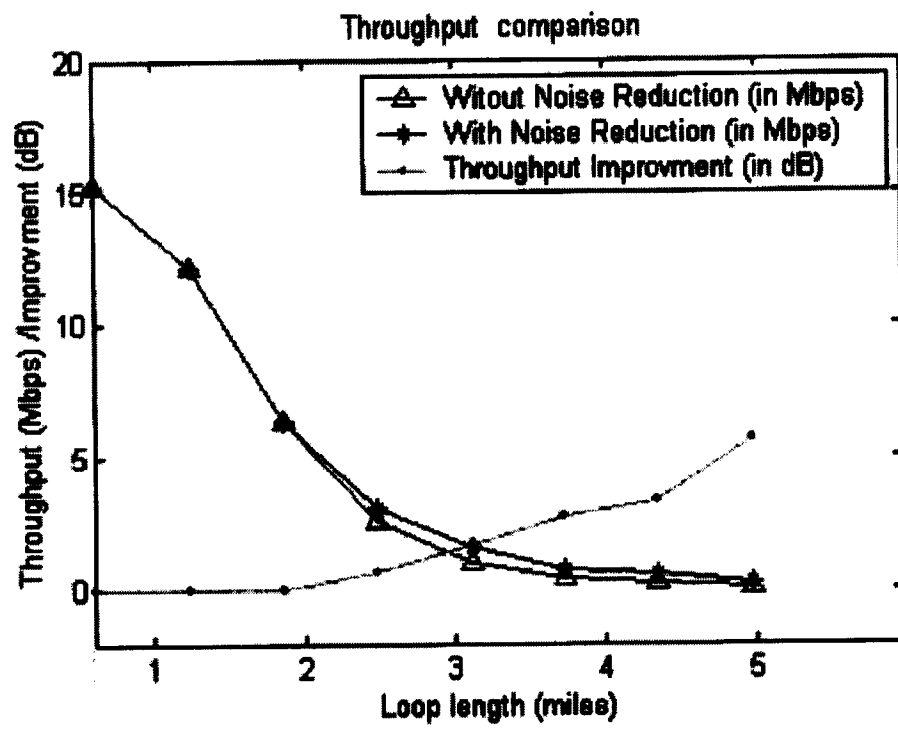


Fig. 6

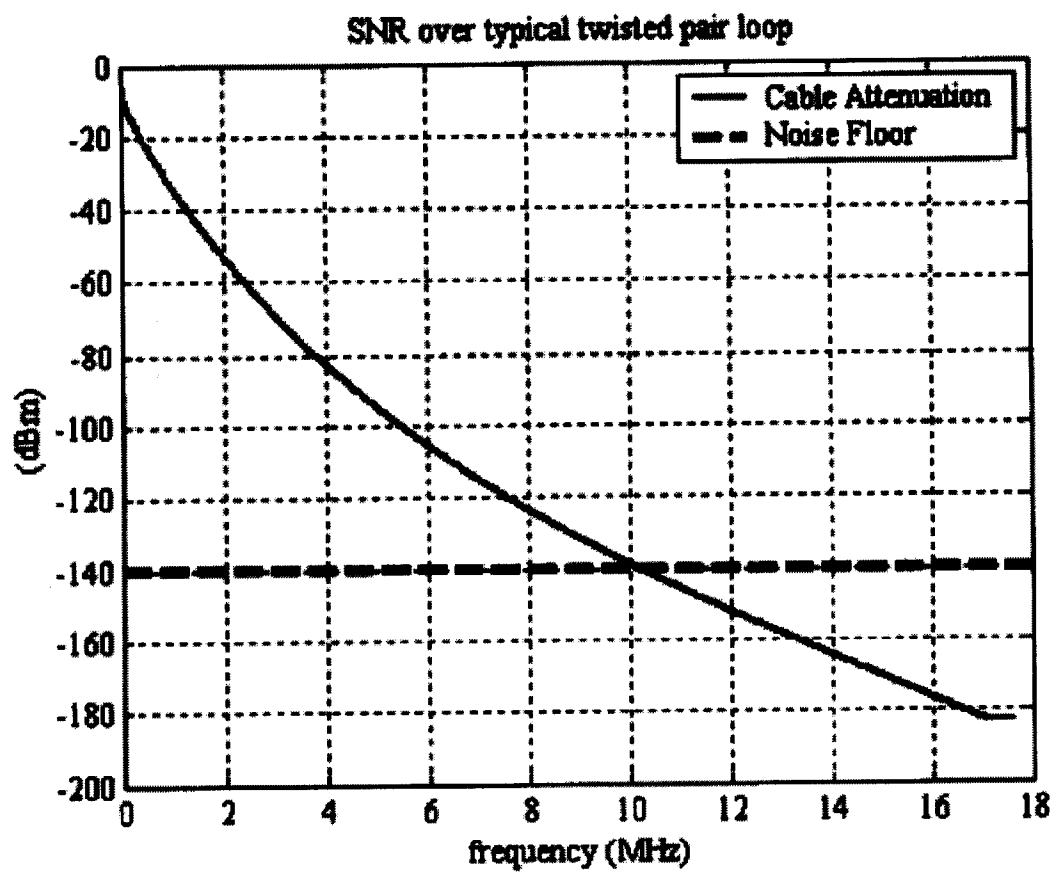


Fig. 7

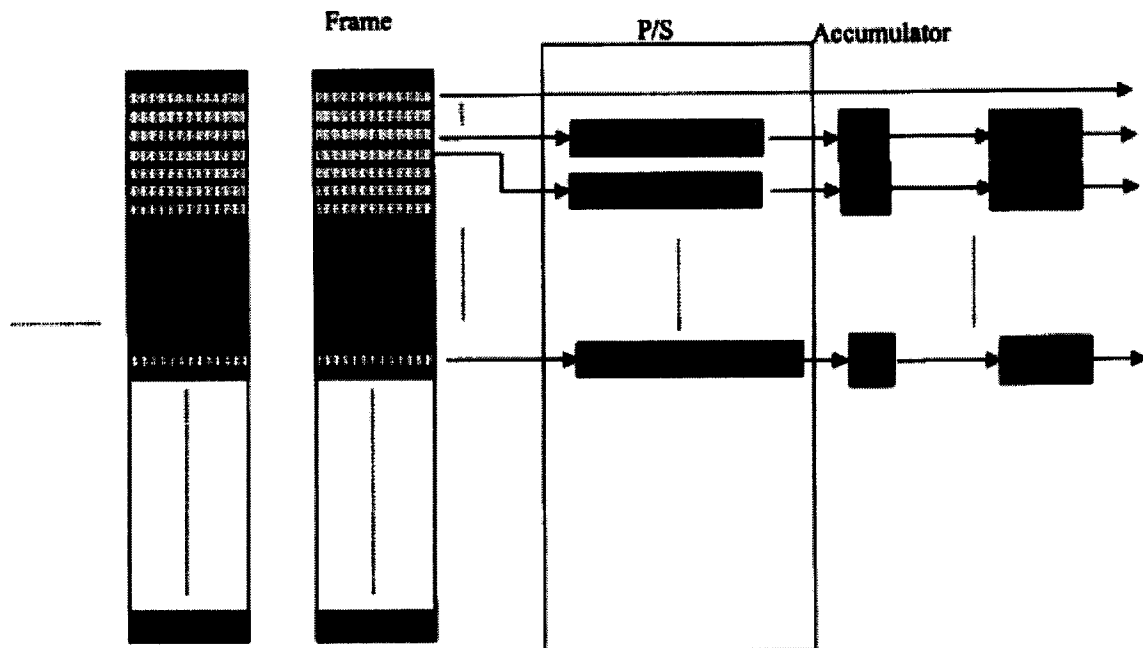


Fig. 8

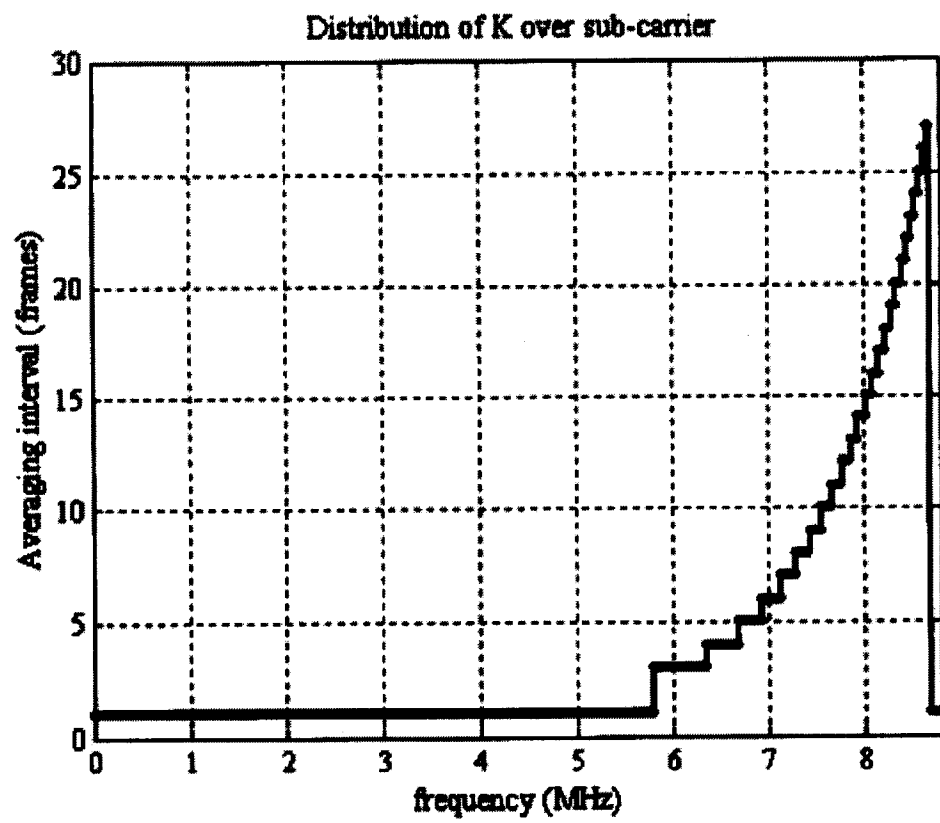


Fig. 9

$$(1) \quad N_{\text{useful}} = \frac{(N/2 - 1)}{K}$$

$$(2) \quad \sigma_{n'}^2 = \frac{1}{K} \sigma_n^2$$

$$(3) \quad SNR = \frac{\sigma_s^2}{\sigma_n^2}$$

$$(4) \quad SNR_{\text{averaged}} = K * SNR_o$$

Where SNR_o is the SNR of a particular carrier without using

$$(5) \quad b_i = \left\lfloor \log_2 \left(1 + \frac{SNR_{\text{averaged}}}{\Gamma} \right) \right\rfloor$$

Where i is the sub-carrier index, and Γ is the SNR gap. Moreover, operator $\lfloor \rfloor$ denotes the floor function.

$$(6) \quad b_{\text{frame}} = \sum_{i=1}^{N_{\text{useful}}} b_i$$

$$(7) \quad R = R_s * b_{\text{frame}}$$

Where R_s is the DMT frame rate.

Fig. 10

$$(8) \quad b_i = \left\lfloor \log_2 \left(1 + \frac{SNR}{\Gamma} \right) \right\rfloor$$

$$(9) \quad b_i = \frac{B}{R_i} \left\lfloor \log_2 \left(1 + \frac{SNR}{\Gamma} \right) \right\rfloor$$

$$(10) \quad \sigma_{n'}^2 = \frac{1}{K} \sigma_n^2$$

$$(11) \quad SNR_{averaged} = K * SNR_o$$

$$(12) \quad b_{i,averaged} = \left\lfloor \frac{B}{R_i} \log_2 \left(1 + \frac{SNR_{averaged}}{\Gamma} \right) \right\rfloor = \left\lfloor \frac{B}{R_i} \log_2 \left(1 + K \frac{SNR_o}{\Gamma} \right) \right\rfloor$$

$$(13) \quad \frac{2^{\left\lfloor b_{i,averaged} \right\rfloor \frac{B}{R_i}}}{2^{\left\lfloor b_{i,averaged} \right\rfloor \frac{B}{R_i}}} = 2 = \frac{\left(1 + K \frac{SNR_o}{\Gamma} \right)}{\left(1 + \frac{SNR_o}{\Gamma} \right)}$$

$$= \frac{\Gamma + K * SNR_o}{\Gamma + SNR_o}$$

Fig. 11

$$(14) \quad 2\Gamma + 2SNR_o = \Gamma + K * SNR_o$$

$$(15) \quad K = \left(1 + \frac{\Gamma}{SNR_o} \right)$$